Remarks

Claim Rejections - 35 U.S.C. §103:

In the March 17, 2003 Office Action, claims 1, 2, 4, 5, 7 - 10, 121 13, 15 - 18, 20 - 22, and 24 - 26 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,918,020 to Blackard in view of U.S. Patent No. 6,385,673 to DeMoney.

Also, claims 3, 6, 11, 14, 19, and 23 were rejected under 35 U.S.C. 103(a) as being unpatentable over Blackard and DeMoney in view of U.S. Patent No. 5,418,912 to Christenson.

MPEP §706.02(j) states:

"To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)."

MPEP §2143.01 states:

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved, as a whole would have suggested to those of ordinary skill in the art. In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

Applicants respectfully submit that the applied references, taken singly or in combination, assuming, arguendo, that the combination of the applied references is proper, do not teach or suggest one or more elements of the claimed invention, as further discussed below.

For explanatory purposes, applicants discuss herein one or more differences between Blackard, DeMoney and Christenson, and the claimed invention with reference to one or more parts of Blackard, DeMoney and Christenson. This discussion, however, is in no way meant to acquiesce in any characterization that one or more parts of Blackard, DeMoney and/or Christenson correspond to the claimed invention.

According to embodiments of the present invention, a flow control module is placed in the streams of data as it passes between a plurality of sources from above and below the flow control module. The flow control module calculates via aggregate counters the

aggregate data rate for the upstream and downstream streams of data and the individual data rate (bytes per second) via individual data rate counters associated with each stream of data in both the upstream stream direction and the downstream directions of the streams of data. The aggregate counters are compared to predetermined threshold values for the upstream and downstream data and throttled appropriately. Additionally, the individual data rate counters are each compared to a predetermined individual data rate threshold value and throttled appropriately. The flow control of data using the aggregate data rate counters and the individual data rate counters act upon the data in the upstream and downstream when the threshold values are exceeded. Furthermore, the counters are decremented at predetermined periods by a predetermined number of bytes.

In Fig. 1, an illustration of a block diagram of a flow control module 102 coupled to a plurality of applications 104-110 and a transport layer provider 112 in accordance with an embodiment of the invention. The flow control module 102 is coupled through software to a plurality of applications, labeled "APPLICATION-1" to "APPLICATION-N", 104-110 respectively. The applications 104-110 are contained at the application software level and interface with the operating system software level. The flow control module 102 is also coupled to the transport layer provider 112 within the operating system software level. The transport layer provider 112 is coupled via software and device drivers to hardware that is connected to a physical media 114 associated with a network.

An aggregate stream of data is comprised of a plurality of individual streams of data from applications 104-110. The flow control module 102 adds to or increments an aggregate counter by the amount of data (i.e. bytes of data) that is received at the flow control module 102 per period of time (i.e. second). The aggregate counter is checked every time data is

encountered by comparing the aggregate counter value to a predetermined aggregate threshold (80,000 byte). The aggregate counter is decremented by a predetermined amount every time a timer expires. The timer is set to a predetermined value, such as 1 second. If the aggregate threshold is exceeded when the aggregate counter value is checked then all streams of data from the applications 104-110 are throttled.

Similarly, the individual data rate of each stream of data that make up the combined aggregate stream of data is determined using an individual counter associated with the individual stream of data. If the individual counter exceeds a predetermined threshold value of data bytes, then the stream of data associated with the individual counter is throttled. The individual counters are decremented in a similar way as the aggregate counters. At the expiration of a timer having a predetermined period, such as one second, each of the individual counter values are decremented by a predetermined amount (8,000 bytes). The amount to decrement each individual counter can be unique for each individual counter or all individual counters can be decremented by the same value (8,000 bytes). Furthermore, the individual and aggregate counters in the present embodiment can never go below zero. In an embodiment of the invention the UNIX operating system using the UNIX streams library may selectively be used to enable and disable data flow in response to the individual and aggregate predetermined thresholds.

The applications 104-110 are also active and may be receiving or transmitting data at the same time. As described above, the flow control module 102 has an upstream and downstream aggregate counter for counting the received and transmitted bytes from applications 104-110. When the upstream or downstream aggregate counter exceeds the associated aggregate data rate threshold for a period of time (i.e. a second), the flow control

module throttles all the streams of data from the applications 104-110. Similarly, when the individual stream of data exceeds the individual data rate threshold, then the individual stream of data is throttled.

When the aggregate counter no longer exceeds the aggregate data rate threshold, then the throttling of the aggregate stream of data ceases, provided the individual data rate threshold is not exceeded. Similarly, the individual stream of data is unthrottled once the individual data rate for the individual stream of data no longer exceeds the individual data rate threshold.

As to claim 9 of the present application, the Office Action alleges: that Blackard teaches (column 2, lines 45 - 67; column 3, lines 1 - 15; column 5, lines 52 - 56; column 7, lines 28 - 48; column 1 0, lines 25 - 45) shared flow control of data (communication network includes a server for transmitting a plurality of information values at a first rate until a pacing message is received by the server) between a transport layer interface provider (communication stack 340, Fig. 3) and at least one application (client 108, Fig. 3); that Blackard teaches receiving (data receiver 342 receives the data packet from communication stack 340, Fig. 3) from the transport layer interface provider (communication stack 340, Fig. 3) a stream of data (data packets) having a first aggregate upstream data rate (transmitting a plurality of information values at a first rate); that Blackard teaches measuring the first aggregate upstream data rate of the stream of data (determining a first number of data values stored in the buffer pool of the client computer system); that Blackard teaches transmitting the stream of data to the at least one application (push data receiver 342 receives the data packet, including header status information, from communication stack 340, Fig. 3); and that Blackard teaches throttling the stream of data (pacing operation) from the first aggregate

upstream data rate to a second aggregate upstream data rate (pacing operation is accomplished by the client device sending the server device a pacing primitive which contains a number of transmission time periods the server should wait in sending data to the client).

The office action admits that Blackard teaches (column 21 lines 45 - 55) transmitting a stream of data (transmitting a plurality of information values), but does not specify the stream of data is made up of a plurality of streams of data.

However, the office action then cites DeMoney as allegedly teaching (column 17, lines 23 - 37) transmitting a stream of data that is made up of a plurality of streams of data (multiple continuous media streams in which data streams are delivered at a specified and possibly time-varying data rate) and flow control (control admission of new continuous streams) of the aggregate streams (video storage manager must control admission of new continuous streams to ensure that the aggregate of the guaranteed stream rates does not exceed the aggregate storage bandwidth allocated for continuous media streams).

The office action then concludes that it would have been obvious to apply the teaching of transmitting a stream of data that is made up of a plurality of streams of data as taught by DeMoney to the invention of Blackard because this would provide efficient utilization of system bandwidth.

In column 5, lines 23-41 of Blackard, it is explained that the pacing mechanism insures that data is transmitted from a server to a client in an effective and accurate manner to implement real-time operations in a communications network. To implement this pacing

mechanism, the streaming server transmits data at a slightly faster rate than it was encoded. Subsequently, a decoder circuit on the client, or receiver, uses the transmitted data at an encoded rate. Therefore, the client uses the transmitted data at a slightly lower rate than the data is being received. Thus, the utilization of buffers in the client will gradually increase. When the utilization of the buffers reaches a threshold level, the client provides a Pace Message to the server. When the Pace Message is received, the server withholds sending data for a period of time sufficient to drop the client buffer utilization to a level below a threshold level. Through the use of this method, the streaming server of the present invention will effectively track a rate of decoding performed by the client, while fundamentally continuing to operate as a streaming server.

Also, according to column 5, lines 29-60, when a fill level associated with the client buffer rises above a threshold mark, the client device initiates pacing to the server device. This pacing operation is accomplished by the client device sending the server device a pacing primitive, which contains a number of transmission time periods the server should wait in sending data to the client. In implementing this methodology, no data is lost or skipped, but only delayed in the server by the specified time periods. A number of periods to wait is determined by the client such that additional pacing will not be required until after the requested pacing is accomplished and a guardband time period has expired.

However, this is not the throttling disclosed and claimed in the present application. In the present invention, when the upstream or downstream aggregate counter exceeds the associated aggregate data rate threshold for a period of time (i.e. a second), the flow control module throttles all the streams of data from the applications. Similarly, when the individual

stream of data exceeds the individual data rate threshold, then the individual stream of data is throttled.

When the aggregate counter no longer exceeds the aggregate data rate threshold, then the throttling of the aggregate stream of data ceases, provided the individual data rate threshold is not exceeded. Similarly, the individual stream of data is unthrottled once the individual data rate for the individual stream of data no longer exceeds the individual data rate threshold.

This throttling is claimed in each of the independent claims of the present application and is not taught or disclosed by Blackard.

With regard to DeMoney, DeMoney teaches that clients or requesters for a multimedia stream contract with the video storage manager for access to a file at a desired bit rate. The video storage manager assesses available storage bandwidth and available buffer memory to determine whether or not the request can be met. Once the video storage manager has established that the request can be accommodated, the client is given access to the file at any bit rate up to the contracted rate. If the request exceeds available storage bandwidth and/or buffer memory is exhausted, the video storage manager must reject the request and the client is free to adjust and/or resubmit the request at a later time (see column 9, lines 38-48).

However, in the present claimed invention, an aggregate stream of data is comprised of a plurality of individual streams of data from applications. The flow control module adds to or increments an aggregate counter by the amount of data (i.e. bytes of data) that is received at the flow control module per period of time (i.e. second). The aggregate counter is

checked every time data is encountered by comparing the aggregate counter value to a predetermined aggregate threshold (80,000 byte). The aggregate counter is decremented by a predetermined amount every time a timer expires. The timer is set to a predetermined value, such as 1 second. If the aggregate threshold is exceeded when the aggregate counter value is checked then all streams of data from the applications are throttled.

Thus, for example, Blackard and teach that a client controls "pacing" (see column 5, line 14 of Blackard), and DeMoney teaches that, if the request exceeds available storage bandwidth and/or buffer memory is exhausted, the video storage manager must reject the request (column 5, lines 46-49). Taken either singly or in combination, this does not disclose the throttling that is claimed in the present application. The throttling in the present application operates independent of the client, and throttling does not reject data streams.

The office action stated that as to claim 1, this is the same as method claim 9 except the flow control method is performed on downstream data instead of upstream data. The office action alleges that Blackard teaches (column 12, lines 28 - 40) upstream (communication system in which client 108 is able to retrieve information from a plurality of information servers, Fig. 1) and downstream (transmission of application data from client 108 to information server 102, Fig. 1) communication. The office action then concludes that the method of flow control as taught by Blackard could also be applied to the downstream communication connection because this would provide efficient utilization of downstream connection bandwidth. However, for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claim 17 according to the office action, this is a product claim that corresponds to method claim 1; note the rejection to claim 1 above, which also meet this product claim. For the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claim 21 according to the office action, this is a product claim that corresponds to method claim 9; note the rejection to claim 9 above, which also meet this product claim. Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claim 25 according to the office action, Blackard teaches (column 2, lines 45 - 67; column 3, lines 1 - 15; column 5 , lines 23 - 40 and 52 - 56; column 7, lines 28 - 48; column 1 0, lines 25 - 45) aggregate stream of data at a first data rate between at least one application process and a network (communication network includes a server for transmitting a plurality of information values at a first rate until a pacing message is received by the server), comprising: a flow control module (pacing mechanism); counting an amount of received data (determining a first number of data values stored in the buffer pool of the client computer system); and a transport layer provider (communication stack 340, Fig. 3) coupled to the flow control module for receiving the aggregate stream of data (push data receiver 342 receives the data packet, including header status information, from communication stack 340, Fig. 3) and modifying the first data rate (pacing operation) of the aggregate stream of data in response to a signal from the flow control module in response the comparison of the aggregate counter to an aggregate threshold (pacing operation is accomplished by the client device sending the server device a pacing primitive which contains a number of transmission

time periods the server should wait in sending data to the client). As to aggregate stream, see the rejection to claim 9. As to decrementing a counter, see the rejection to claim 1. However, for the reasons set forth above with regard to claim 9 and to claim 1, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 2, 10, 18, and 22, Blackard as modified teaches (column 3, lines 1 16 of Blackard) counting the amount of received data (determining a first number of data values stored in the buffer pool of the client computer system) but does not specify a counter. Obviously, there would need to be a counter variable in order to represent the number of data stored in the buffer. Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 4, 12, 20, and 24 according to the office action, Blackard as modified teaches (column 3, lines 1 17; column 5, lines 23 - 45 of Blackard) comparing the aggregate upstream counter (first number of data values stored in the buffer pool) to a predetermined (threshold level) downstream aggregate threshold, and notifying the transport layer interface provider (transmitting a pacing message to the server) to throttle the plurality of streams of data (server withholds sending data for a period of time sufficient to drop the client buffer utilization to a level below a threshold level). Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 5 and 13 according to the office action, Blackard as modified teaches (column 9, line 57 - column 1 0, line 5.of DeMoney) identifying an individual upstream stream of data from the plurality of streams of data (each stream may have a different contract rate), and counting from the individual upstream stream of data an individual amount of received data with an individual upstream counter (an individual stream may arbitrarily range in rate up to the contract rate wherein the total aggregate for all stream rates does not exceed the total aggregate streaming capacity of the server system). Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 7 and 15 according to the office action, Blackard as modified teaches (column 9, line 57 - column 1 0, line 5 of DeMoney) comparing the individual upstream (an individual stream may arbitrarily range in rate) counter to a predetermined (contract rate) upstream individual threshold (an individual stream may arbitrarily range in rate up to the contract rate wherein the total aggregate for all stream rates does not exceed the total aggregate streaming capacity of the server system). Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 8 and 16 according to the office action, Blackard as modified teaches (column 8, lines I - 17 of Blackard) an operating system such as AIX, which is a type of Unix operating system, is used to coordinate the functions of the various components of the client and server. When the client and server are running a Unix operating system, the step of

throttling the stream of data would obviously be performed by Unix stream functions. Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claim 26 according to the office action, this is an apparatus claim that is a combination of method claims 13 and 15: note the rejection to claims 13 and 15 above, which also meet this apparatus claim. Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

As to claims 3, 11, 19, and 23 according to the office action, Blackard teaches counting the amount of received data (see claim 10) but does not specify incrementing and decrementing a counter. The office action then cites Christenson as teaching (column 5, lines 5 - 15 and 33 - 51; column 5, line 52 - column 6, line 10) controlling data transmission (session layer 24 is provided with a control mechanism for limiting the amount of data which may be sent to the data link control layer 28, Fig. 2) and counting amount of received data with a counter (flood control counter FCC... is used to count session packets), incrementing (FCC is incremented) and decrementing (decrements the FCC) the counter.

The office action then concludes that it would have been obvious to apply the teaching of incrementing and decrementing a counter to represent the amount of received data as taught by Christenson to the invention of Blackard because this would dynamically

measure the amount of data being transferred and this information is used to make flow control decisions and prevent problems such as buffer overflow.

Christenson teaches (column 5, lines 56-59) that if FCC is not equal to 0, the transmission block can be sent 46, and the session layer 24 decrements FCC 48. The FCC is used to count session packets. However, for example in claim 3 of the present application, the present invention decrements the aggregate downstream counter by a predetermined amount at a predetermined interval of time, and not as a function of session packets. Thus, Christenson teaches away from the present invention. Therefore, no combination of the cited prior art would result in the claimed invention of the present application.

As to claims 6 and 14 according to the office action, Blackard as modified teaches (column 9, line 57 - column 10, line 5 of DeMoney) counting an individual amount of received data (an individual stream may arbitrarily range in rate up to the contract rate wherein the total aggregate for all stream rates does not exceed the total aggregate streaming capacity of the server system). As to incrementing and decrementing a counter, see the rejection to claims 3 and 11 above. Since a defendant claim includes all the limitations of the independent claim upon which it depends, and for the reasons set forth above with regard to claim 9, this claim is also not rendered obvious by any combination of Blackard and DeMoney.

The shortcomings of Blackard relative to certain elements of the claimed invention have been discussed above. To account for at least one of these deficiencies, the Office Action proposes a combination of Blackard with DeMoney. However, DeMoney does not overcome the deficiency of Blackard. Applicants respectfully submit that the proposed

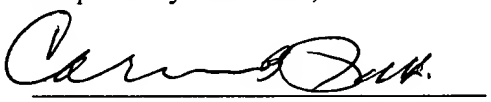
combinations of Blackard and DeMoney fail to provide the required configuration, assuming, arguendo, that the combination of Blackard with DeMoney is proper.

Therefore, no combination of the cited references taken singly or in combination results in the claimed invention of the present application. The independent claims presented herewith are believed neither anticipated nor obvious over the art of the record. The corresponding dependent claims are believed allowable for the same reasons as the related independent claims, as well as for their own additional characterizations.

Reconsideration and withdrawal of the §103 rejections is therefore respectfully requested.

In view of the above amendments and remarks, allowance of all claims pending is respectfully requested.

Respectfully submitted,



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